Chapter 9

Improving the Kanban

The final step in our kanban implementation model is reduction of the kanban quantities. The best way to reduce the quantities, without jeopardizing the customer, is to improve the process or reduce your buffer. To safely improve the production process you should follow a structured program to reduce changeovers, scrap, and downtime. Changing the buffer requires that you to address your safety stock and reduce the supplier lead times.

When looking at process improvements, prioritize the areas of focus before launching off in all directions.

- *To reduce changeover times*, conduct a SMED workshop. The SMED workshop will help you analyze the changeover and develop improvements. The results of the workshop will be a choreographed changeover that has each participant's role mapped out.

- *To reduce scrap*, determine whether the problem arises from lack of standardization and training or from a technical problem. If the issue is standardization and training, resolve these issues before placing heavy emphasis on the technical problems. A lack of standardization and training will prevent long-term technical solutions from being permanently implemented.

- When you begin to focus on the technical issues to reduce scrap, use a structured data-driven process to find the root cause of the major technical issues. Our experience shows that most scrap problems follow the Pareto

principle, which is why we recommend using three-level Paretos to determine the root cause.

- *To reduce downtime*, conduct a TPM workshop. This workshop will help you identify areas for repairs and improvements to bring the equipment back to like new condition and will create a maintenance program to maintain this condition. When setting up the maintenance instructions, look at the whole process and what it will take to maintain the process--develop instructions to achieve this outcome, and then assign responsibilities.
- *To reduce buffers*, address the assumptions behind the safety stock and your raw material supplier's lead-time. When looking at safety stock reductions, answer the questions presented in this chapter to determine whether you can reduce the quantities.
- *To reduce supplier lead times*, work with the supplier to determine their ability to handle the reduced lead time. As you reduce shipment quantities, also watch your transportation cost to make sure you don't achieve smaller raw material inventories at the expense of skyrocketing transportation costs.
- Try to work with suppliers who cannot reduce the ship quantities due to their lead times or batch sizes. Make sure they are aware of the concept of Lean manufacturing. If they do not embrace Lean or cannot support your goals for reducing raw material shipments without an increase in price, then you will need to make the appropriate business decisions for your operation.

Whenever you have achieved a change in one of these areas, follow these steps to change the kanban quantity:

- Recalculate the quantities with the new improvements.
- Assess whether the new quantities cause you to change your design.
- Communicate the changes to the operators and anyone else impacted by the changes.
- Make the changes and get started.
- Keep auditing!

As you move through these steps, you may not need to make design changes or conduct massive retraining, but these areas need to be thought through to ensure continuity.

Identifying Improvement Areas

Use this chapter to target and focus your improvement efforts. Each process is different. This chapter is intended help you through the steps of improving the newly designed kanban--from developing a priority list to implementation.
Start the process by identifying the area with the highest impact on the kanban quantities. To prioritize the improvement areas, perform a parametric study of the various factors that control the size of the kanban. To perform this study, take the current values for scrap, downtime, and changeover time and vary each parameter one at a time by half and by three quarters. Look at which factor gives the largest change and list them below in order of contribution:

1. _____
2. _____
3. _____

Implementing SMED

To improve the process changeover times, conduct a SMED workshop. This workshop will consist of videotaping a representative changeover, then dissecting the steps to identify improvements. Before conducting the workshop, identify a cross-functional team for the workshop. Next select a representative changeover and schedule the videotaping. When setting up for the taping, don't forget to consider logistics. Once you have completed the taping and review, it becomes time to implement the changes and conduct training.

* *Who will be part of the team?*

  _____

  _____

  _____

  _____

  _____

  _____

  _____

  _____

* *Select a representative changeover.*

  _____

* *Videotaping logistics to consider:*

  - Changeover scheduled?
  - Crew available for changeover?

- Video camera ready?
- Extra tapes available?
- Extra batteries or power cords available?

Downtime Reduction

To reduce downtime, conduct a TPM workshop. This workshop will address repair items and develop a plan for scheduled maintenance. The workshop will consist of the following steps:

- Conduct an equipment evaluation and develop a repair list (or yellow tag)
- Perform a deep clean of the process's equipment
- Develop an access and contamination list
- Develop standard work instructions to perform future deep clean activities, TPM work orders, and PM work orders
- Schedule the newly created standard work instructions
- Train the participants on the standard work instructions
- Implement the program

Scrap Reduction

To reduce scrap, perform a Pareto analysis of the scrap causes. This analysis will identify the areas to focus on for the maximum scrap improvements. Once you have identified the focus area, determine which are caused by lack of standard work and which are caused by technical issues. Prioritize standard work

issues over the technical issues to help create a culture of continuous change and maintain the gains from implementing technical solutions.

To build a three-level Pareto for use in identifying the root cause of your processes highest scrap cause or causes, start by building a graph of the scrap causes for the target process. Rank the scrap causes from highest to lowest on the graph. Now identify the top one or two scrap causes for further investigation.

The next level of Pareto looks graphically at the causes of these top scrap items. Following the same format, identify the top items for further investigation.

Finally, repeat the process for those items identified in the previous graph. At this point you should have a fairly good idea of what's causing the scrap and be ready to develop solutions. Once you have eliminated these scrap causes, move onto the next scrap cause using the same three-level Pareto process to eliminate these new items. Remember, the continuous improvement process never stops! Use Figure WB 9-1 to create a prioritized list of scrap reduction projects.

Reducing Buffers

We created the safety stock to cover downtime, quality issues, stock outs, and demand fluctuation. So as time goes on and you gain confidence, review the original assumptions and ask these questions:

- Were we too conservative?
- Or have process factors (such as scrap, downtime, or changeovers) improved?

As you consider the answer to these questions assess how many times you stocked out, how many times you hit red and had to make an emergency changeover, and how many times you had emergency quality problems? Use the answers to the above questions to fill in the quantity review table shown in Figure WB 9-2

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Figure WB 9-1

Fill in each line to identify the causes of scrap in the process. Once you have these causes identified, prioritize and assign individuals to resolve the issues.

Level 1	Level 2	Level 3	Reason: Lack of Standard Work	Reason: Technical Issue
1 _____	1.1 _____	1.11 _____	☐	☐
		1.12 _____	☐	☐
		1.13 _____	☐	☐
	1.2 _____	1.21 _____	☐	☐
		1.22 _____	☐	☐
		1.23 _____	☐	☐
	1.3 _____	1.31 _____	☐	☐
		1.32 _____	☐	☐
		1.33 _____	☐	☐
2 _____	2.1 _____	2.11 _____	☐	☐
		2.12 _____	☐	☐
		2.13 _____	☐	☐
	2.2 _____	2.21 _____	☐	☐
		2.22 _____	☐	☐
		2.23 _____	☐	☐
	2.3 _____	2.31 _____	☐	☐
		2.32 _____	☐	☐
		2.33 _____	☐	☐
3 _____	3.1 _____	3.11 _____	☐	☐
		3.12 _____	☐	☐
		3.13 _____	☐	☐
	3.2 _____	3.21 _____	☐	☐
		3.22 _____	☐	☐
		3.23 _____	☐	☐
	3.3 _____	3.31 _____	☐	☐
		3.32 _____	☐	☐
		3.23 _____	☐	☐

Figure WB 9-2

Part Number	Reduce Kanban Quantity	Do Not Change	Increase Kanban Quantity

After you have filled in Figure WB 9-2, determine who will make these changes.

* *Who is responsible for making the changes?*

_____

_____

When we want to reduce our raw material lead times, we really mean we want more frequent deliveries of the material. The lead-time reductions can happen by the supplier either reducing the batch size to allow more frequent deliveries or making smaller shipments from the existing inventory.

In the simplest case, the supplier maintains an inventory of a common raw material and ships the raw material more frequently. Although this situation appears to be very straightforward, a pitfall exists with the increase in shipments. As you increase the shipments and decrease your WIP due to lead time, your transportation cost can skyrocket. Therefore, you must look at transportation costs as well as the WIP cost reductions when making this decision.

One option to combat higher transportation cost is to use "milk runs" for shipments from multiple suppliers or from a single supplier with deliveries to multiple customers. The intent is to optimize cost for shipment sizes that are smaller than a semi-trailer (or in shipping lingo, "less than a load").

* *List potential milk runs*

_____

_____

_____

_____

_____

* *Who is responsible for setting up the milk runs?*

_____

_____

The more difficult side of reducing supplier lead-times occurs when their lead-times or current processes prevent them from making smaller deliveries without increasing their inventory.

* *Which suppliers can reduce their batch sizes?*

_____

_____

_____

_____

_____

* *Which suppliers will require additional assistance?*

_____

_____

_____

_____

* *Now take these lists and meet with the vendors to reduce their batch sizes. Who will be responsible for follow-up?*

_____

_____